

**Columbia/Snake River Temperature TMDL
Preliminary Draft July, 2003
Appendix A: Problem Assessment
Figures**

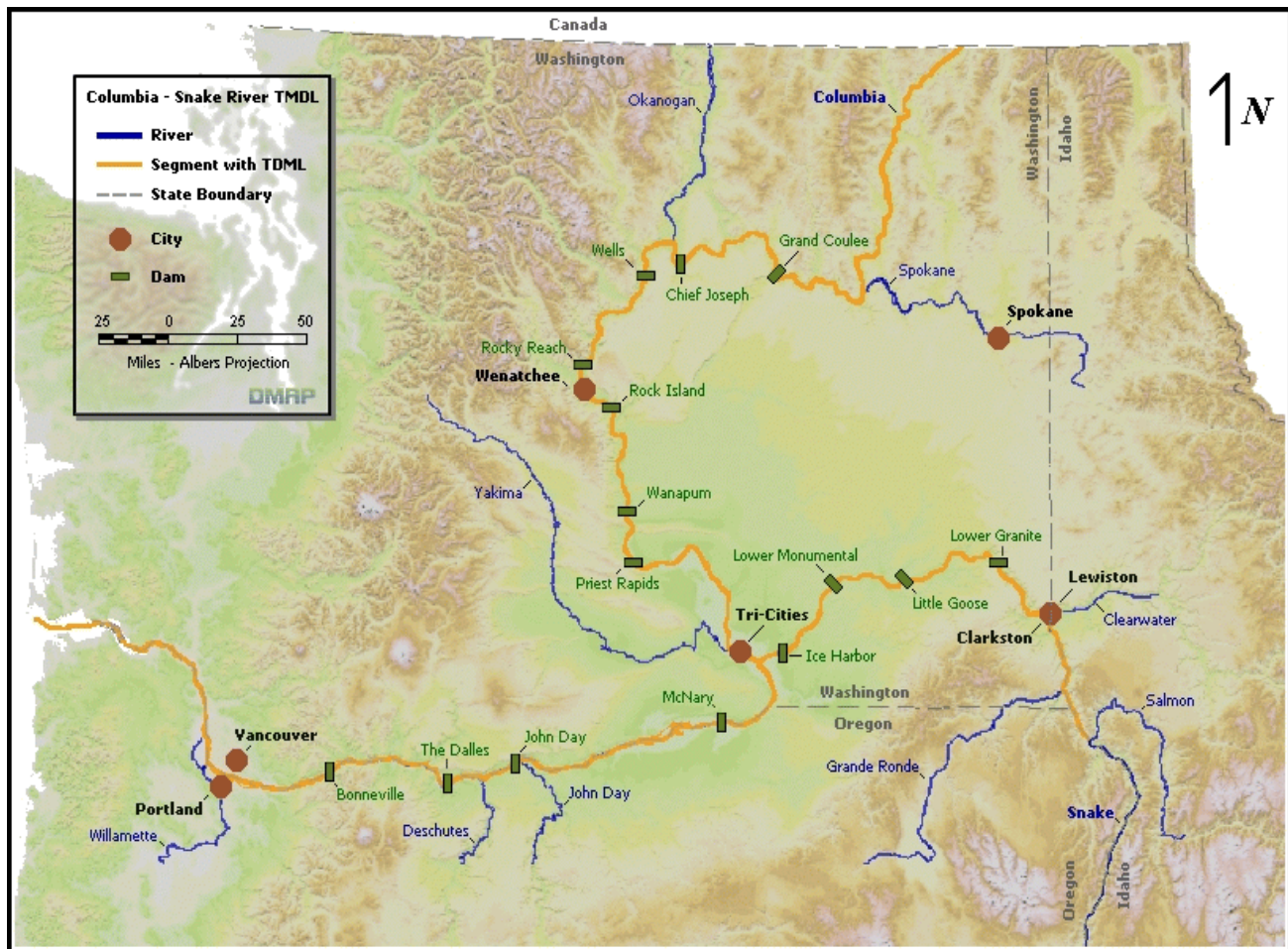


Figure 1-1. The Columbia and Snake rivers in the study area.

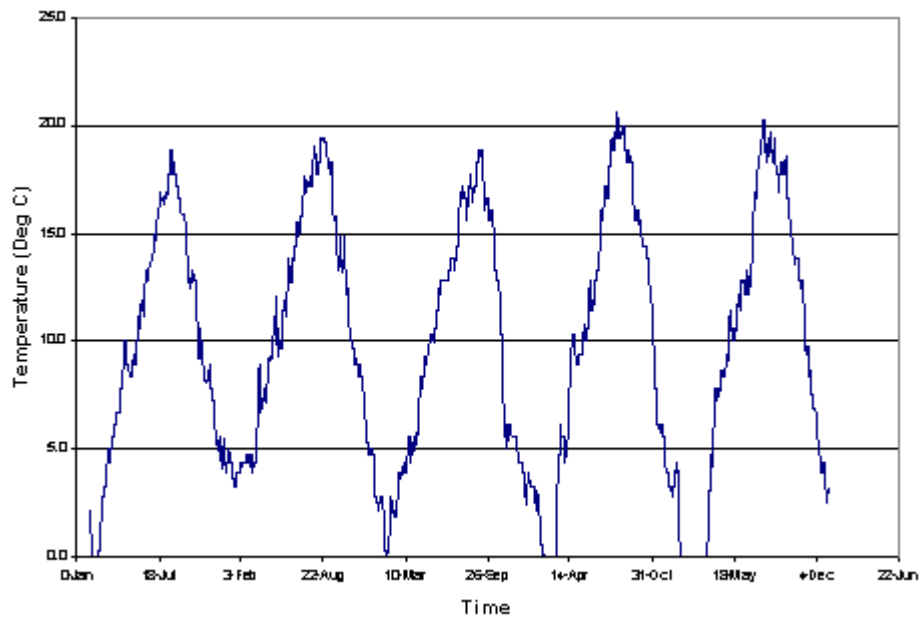


Figure 3-1. Water Temperature in the Scroll Case of Rock Island Dam 1933-1937.

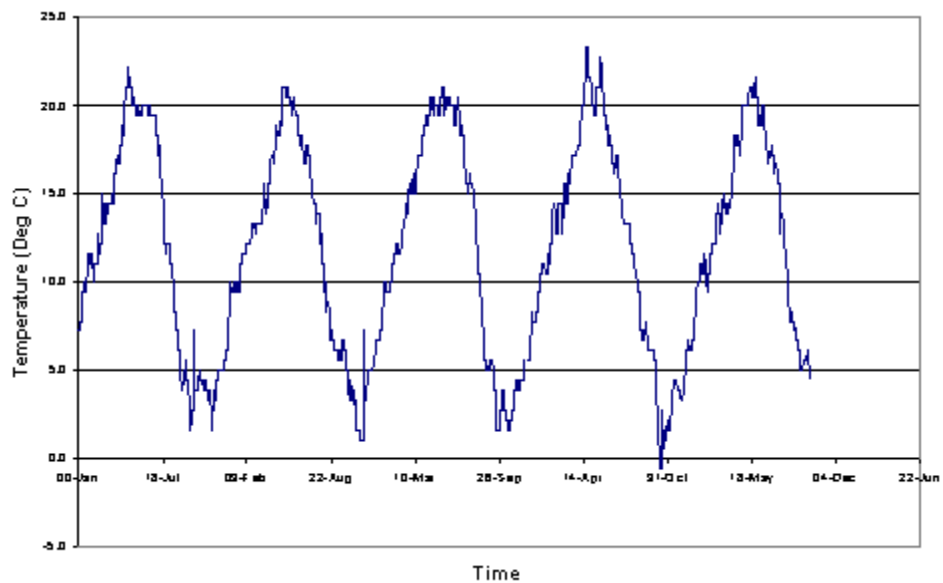


Figure 3-2. Water Temperature at the Scroll Case of Bonneville Dam 1938-1942

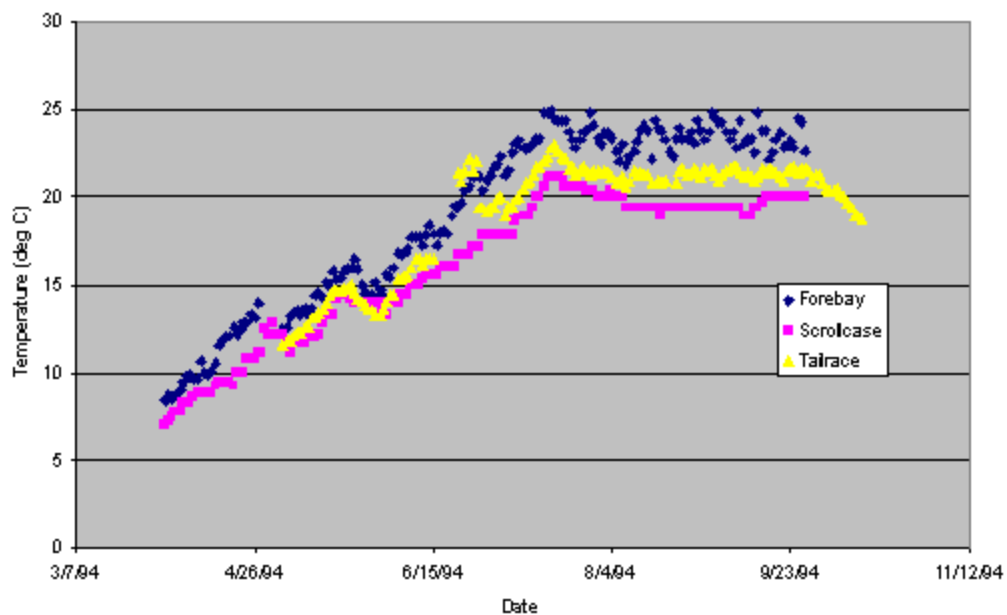


Figure 3-3. Comparison of Daily Water Temperature measured at the Forebay, Scroll Case and Tail Race at Ice Harbor Dam in 1994.

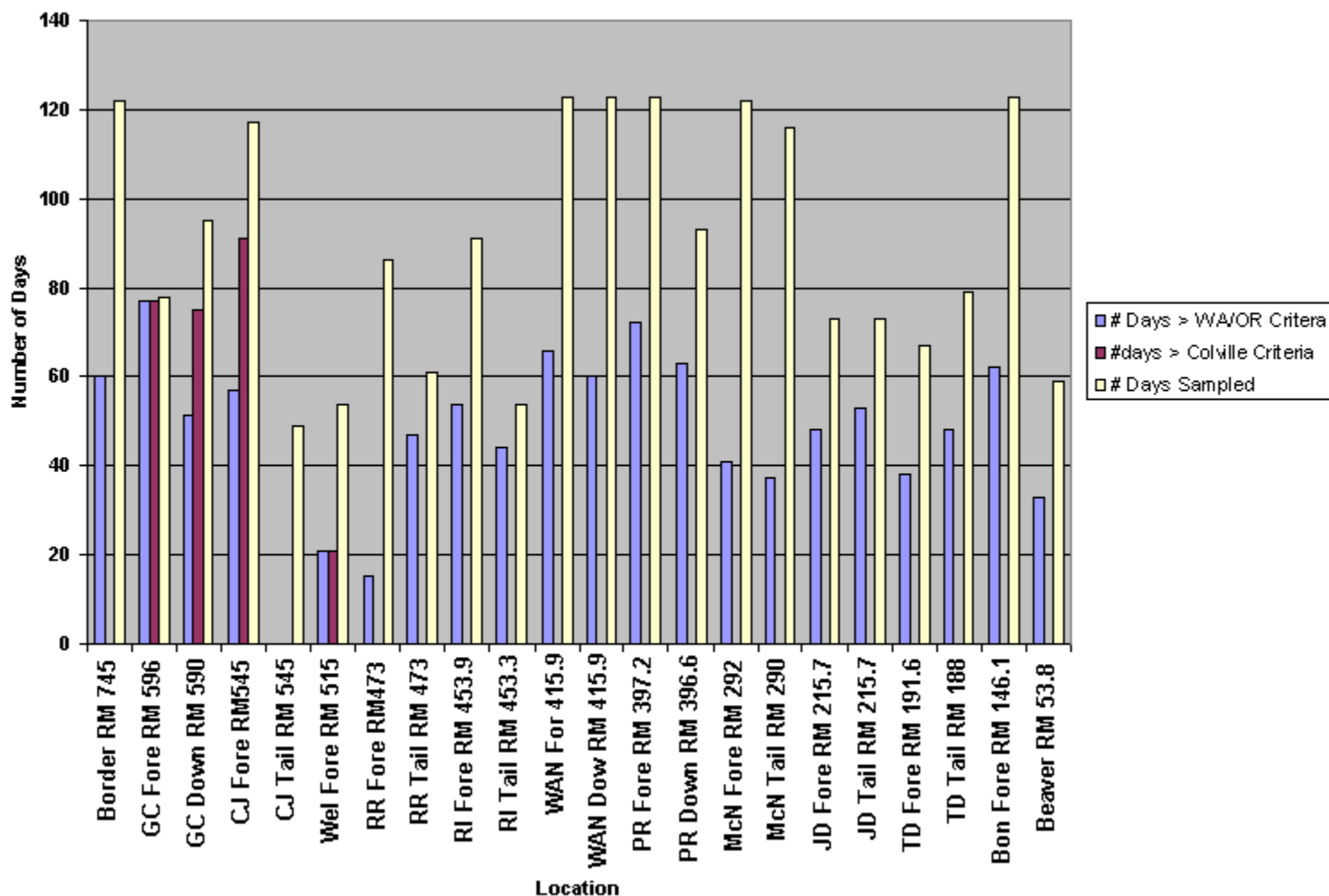


Figure 3-4. July Through October, 1997 - Number of Days during which Water Temperature in the Columbia River Exceeded Water Quality Criteria in Washington, the Colville Reservation and Oregon and the Number of Days for which there are Data. The Oregon criteria apply from river mile 303 to the mouth.

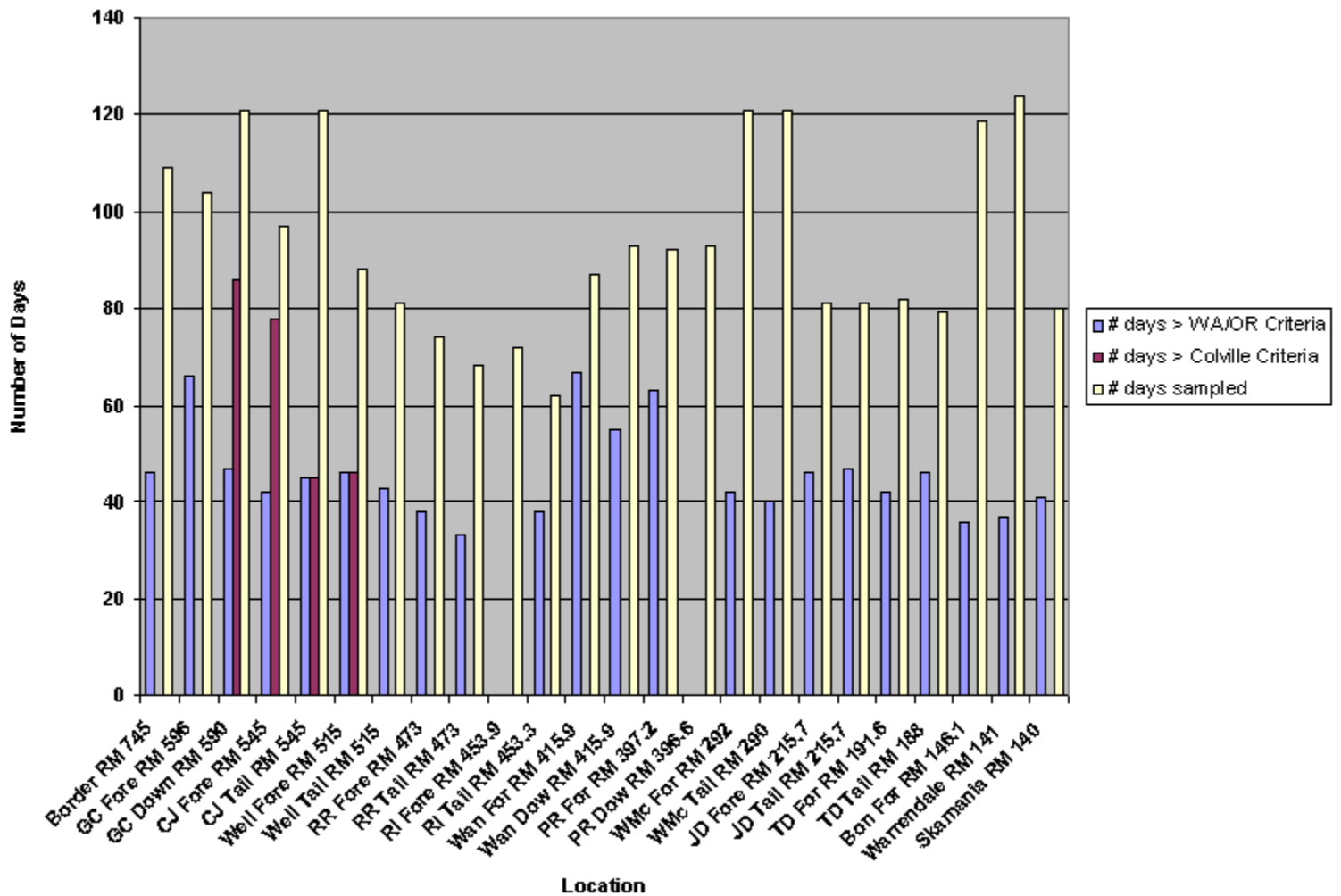


Figure 3-5. July Through October, 2000 - Number of Days during which Water Temperature in the Columbia River Exceeded Water Quality Criteria in Washington, the Colville reservation and Oregon and the Number of Days for which there are Data. The Oregon criteria apply from river mile 303 to the mouth.

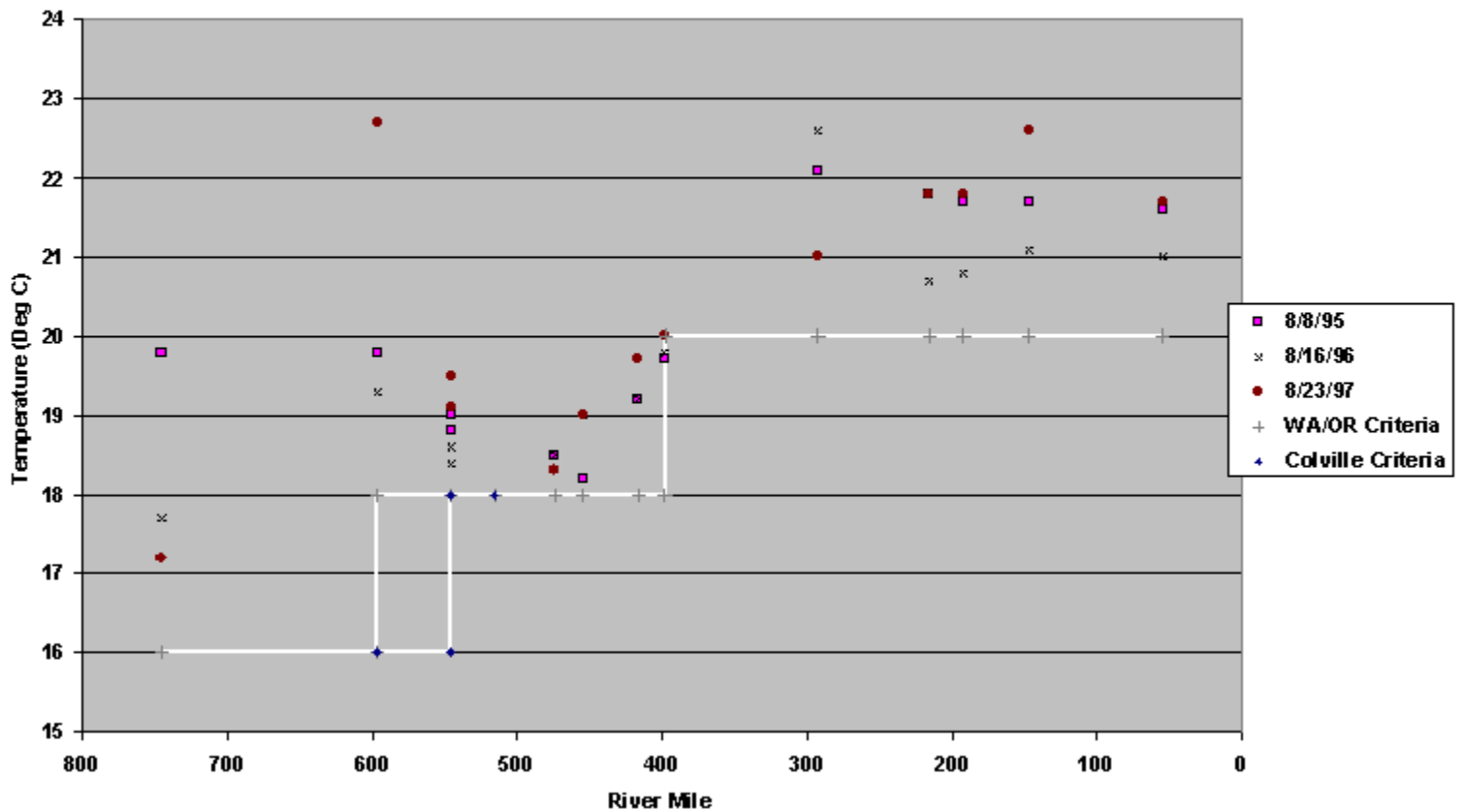


Figure 3-6. Water Temperatures along the Columbia River on August 8, 1995, August 16, 1996 and August 23, 1997 Compared to Washington, Colville and Oregon Water Quality Criteria. The Sampling Sites are the International Boundary, the Fore Bays of all the Dams and Beaverton, OR. The Oregon criteria apply from river mile 303 to the mouth.

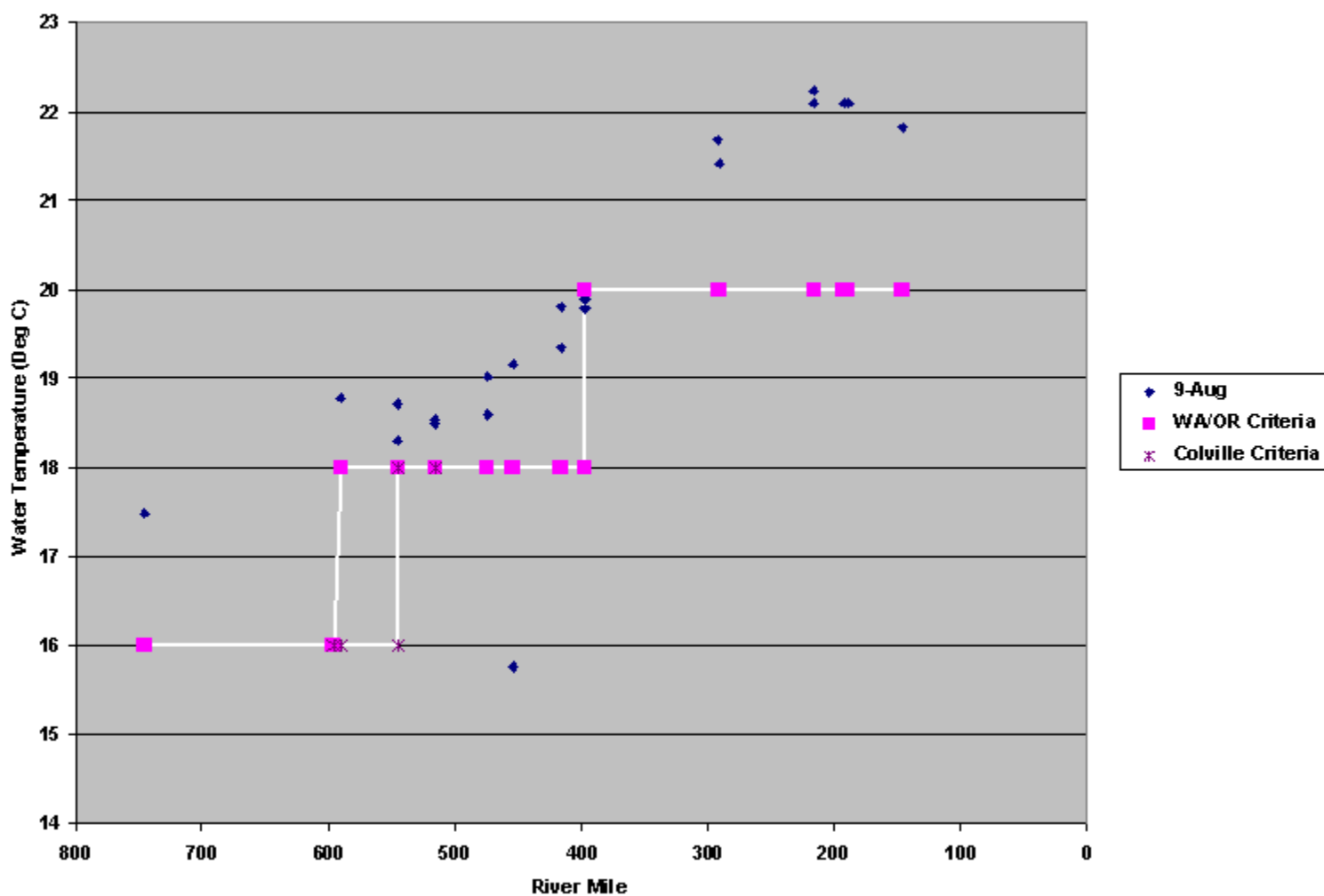


Figure 3-7. Water Temperature in the Columbia River on August 9, 2000 Compared to Washington, Colville and Oregon Water Quality Criteria. Sampling Sites are the Fore Bays and Tail Races of the Dams. The Oregon criteria apply from river mile 303 to the mouth.

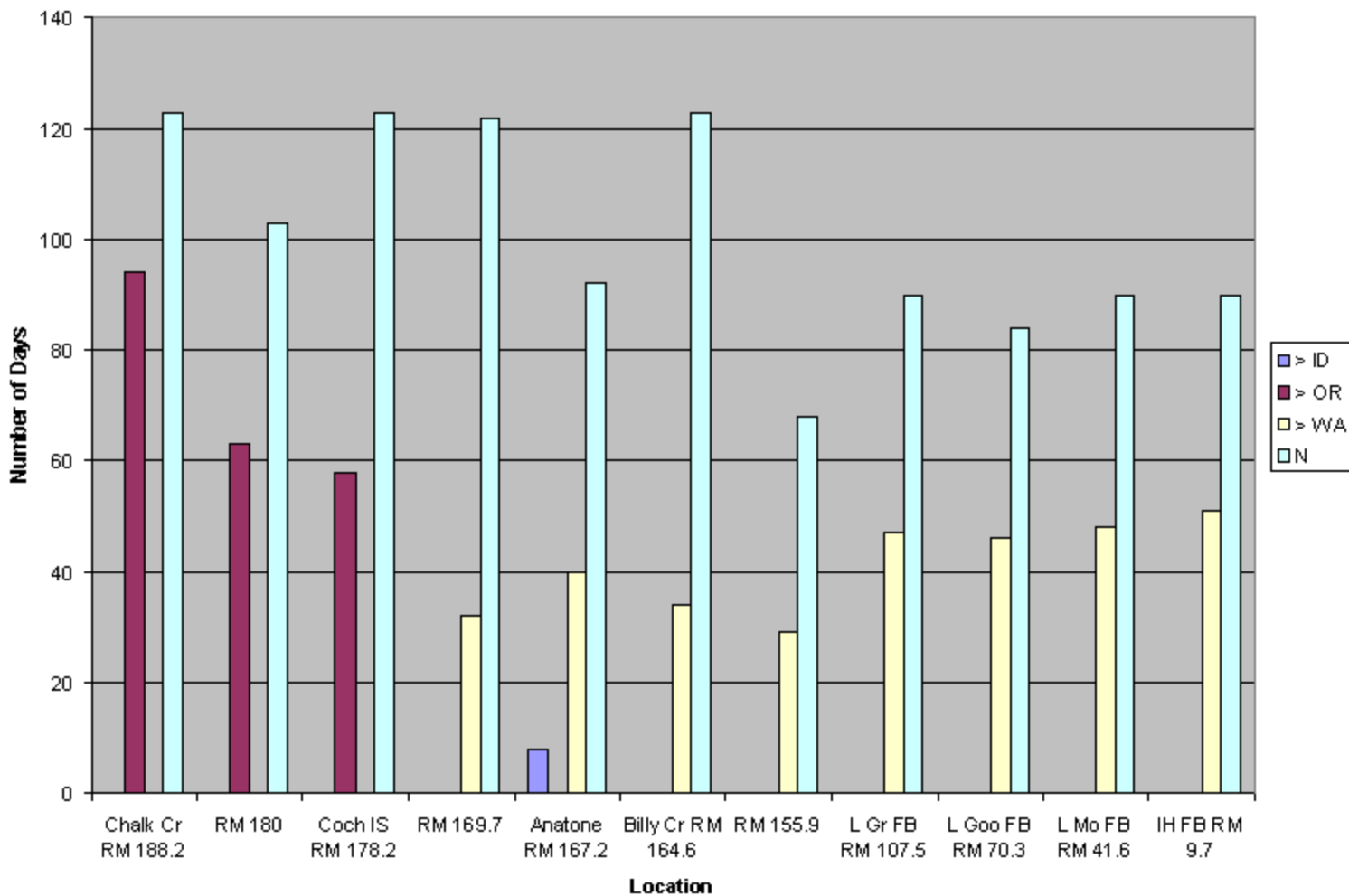


Figure 3-8. July through October, 1993 - Number of Days during which Water Temperature Exceeded Idaho, Oregon or Washington water Quality Criteria in the Snake River and the Number of Days for which there are Data.

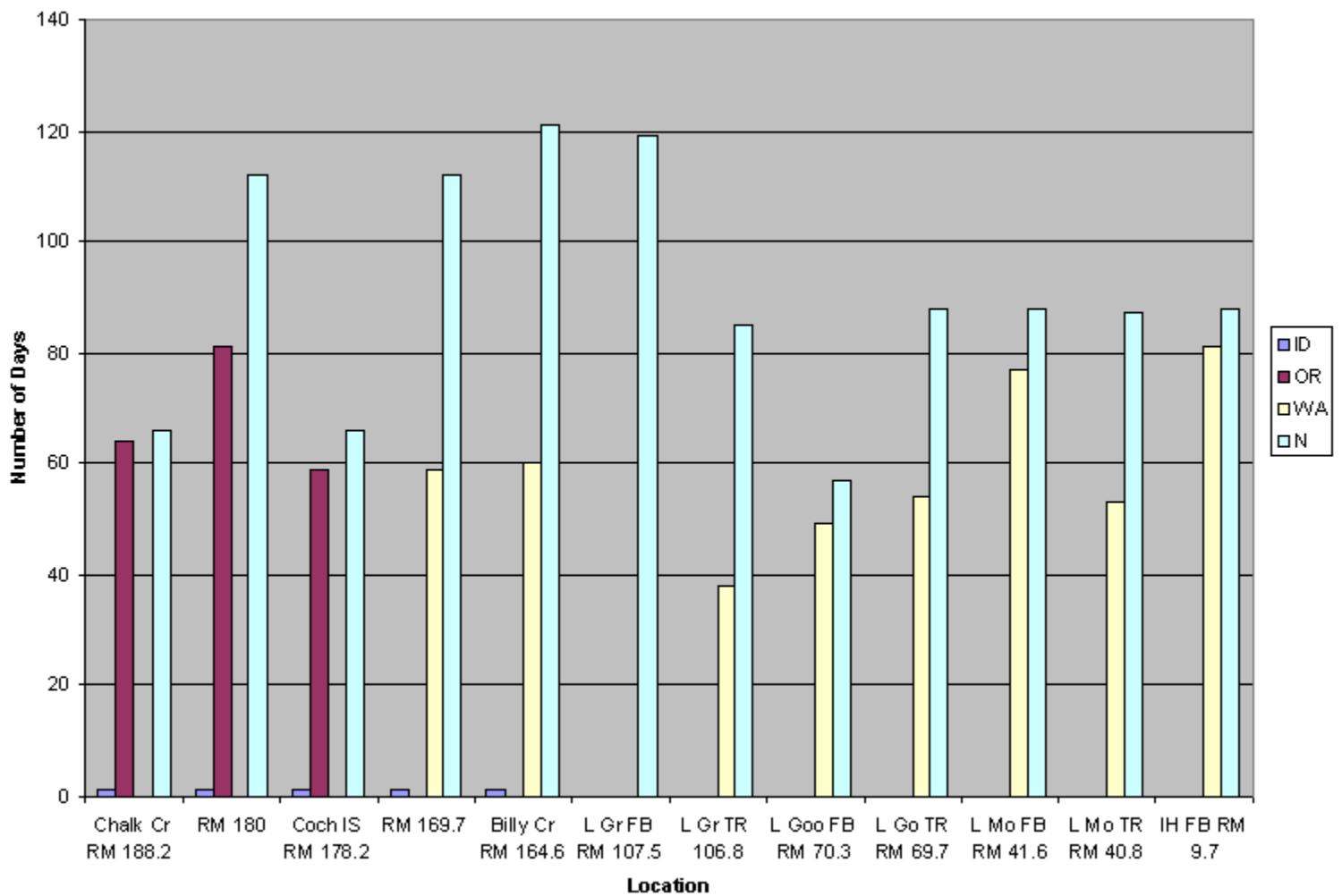


Figure 3-9. July Through October 1995 - Number of Days during which Water Temperature Exceeded Idaho, Oregon or Washington Water Quality Criteria in the Snake River and the Number of Days for which there are Data

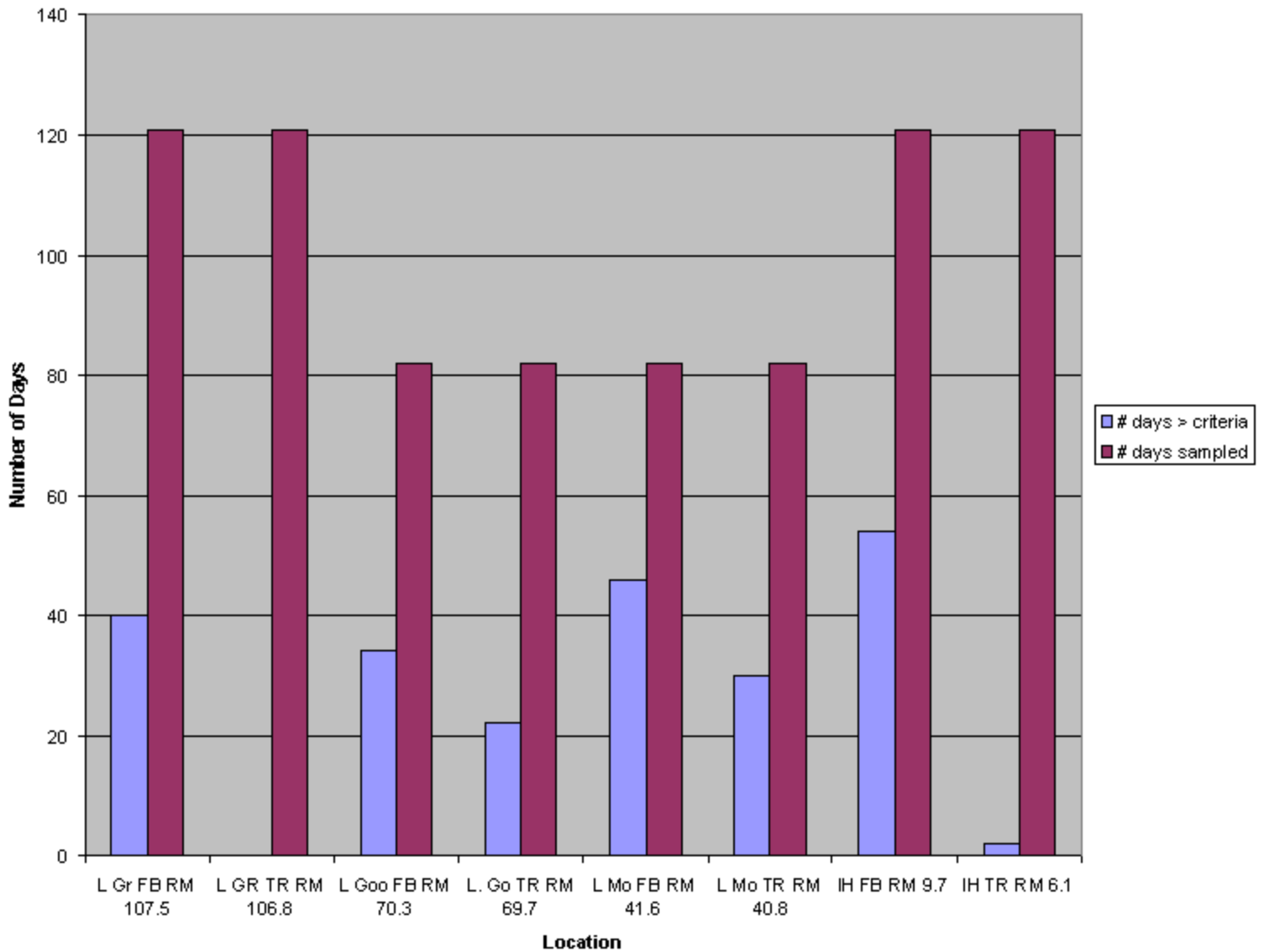


Figure 3-10. July Through October, 2000 - Number of days during which Water Temperature Exceeded Washington water Quality Criteria in the Snake River and the Number of Days for which there are Data.

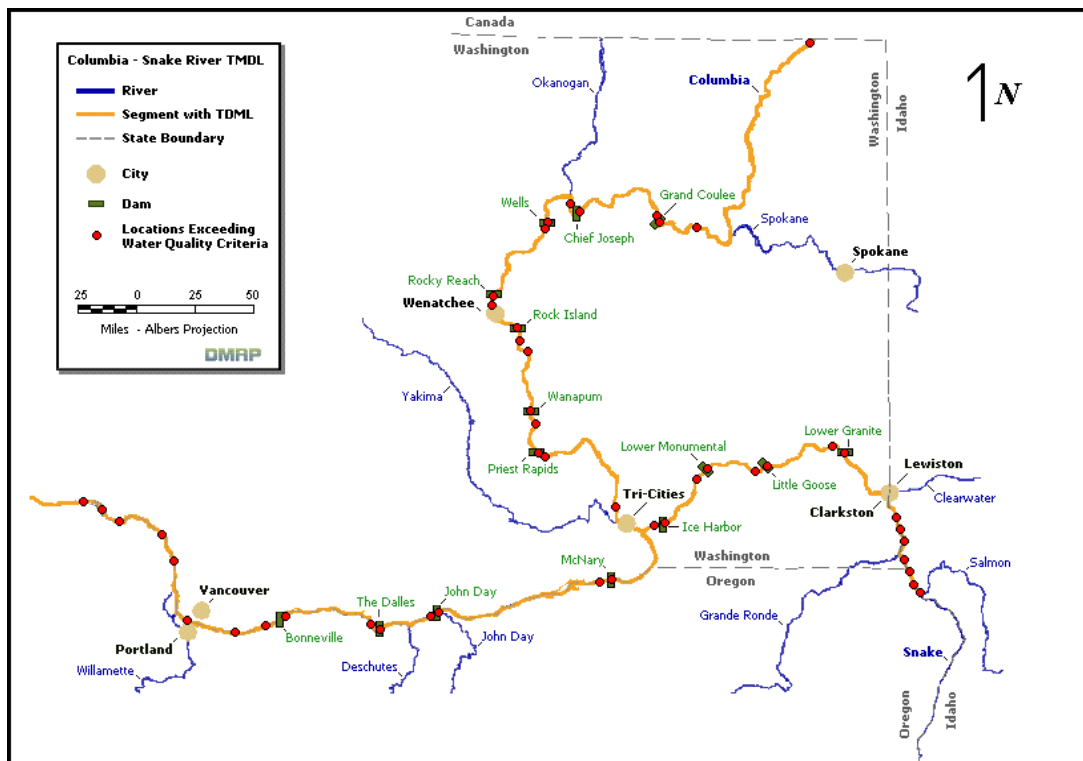


Figure 3-11. Sampling sites along the Columbia River that exceeded Water Quality Criteria for Temperature in the 1990s or later.

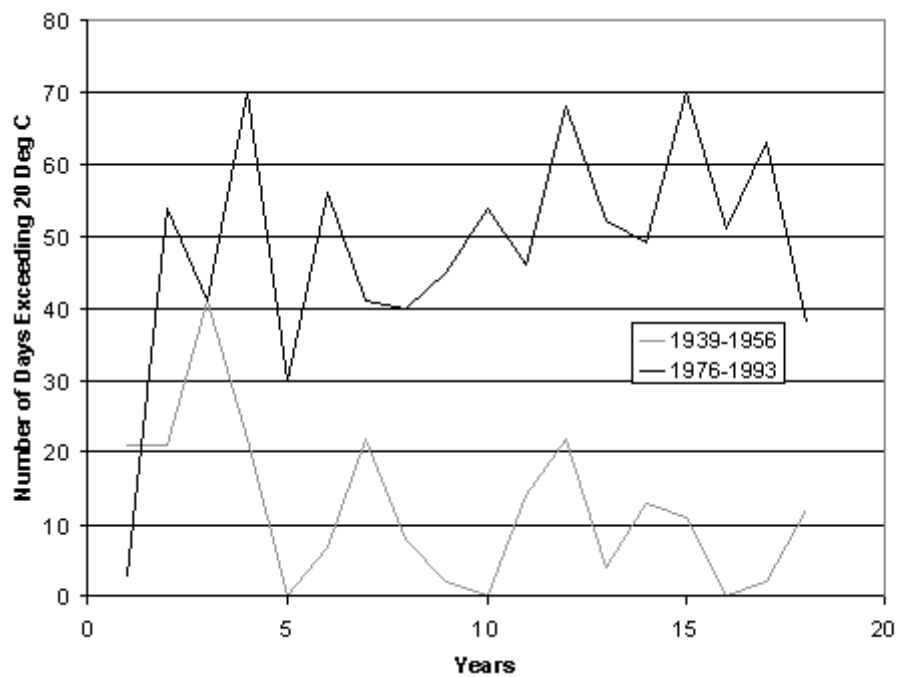


Figure 3-12. Number of Days that exceeded 20 °C at Bonneville: Comparison of the two periods 1939-1956 and 1976-1993.

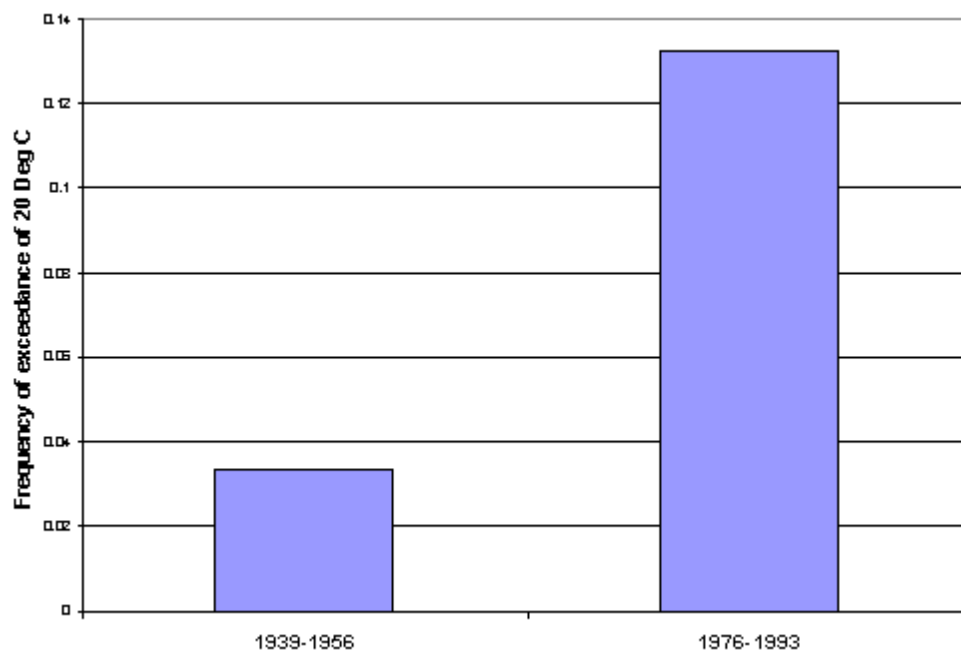


Figure 3-13. Frequency of Exceedance of 20 °C at Bonneville Dam for the two periods 1939-1956 and 1976-1993.

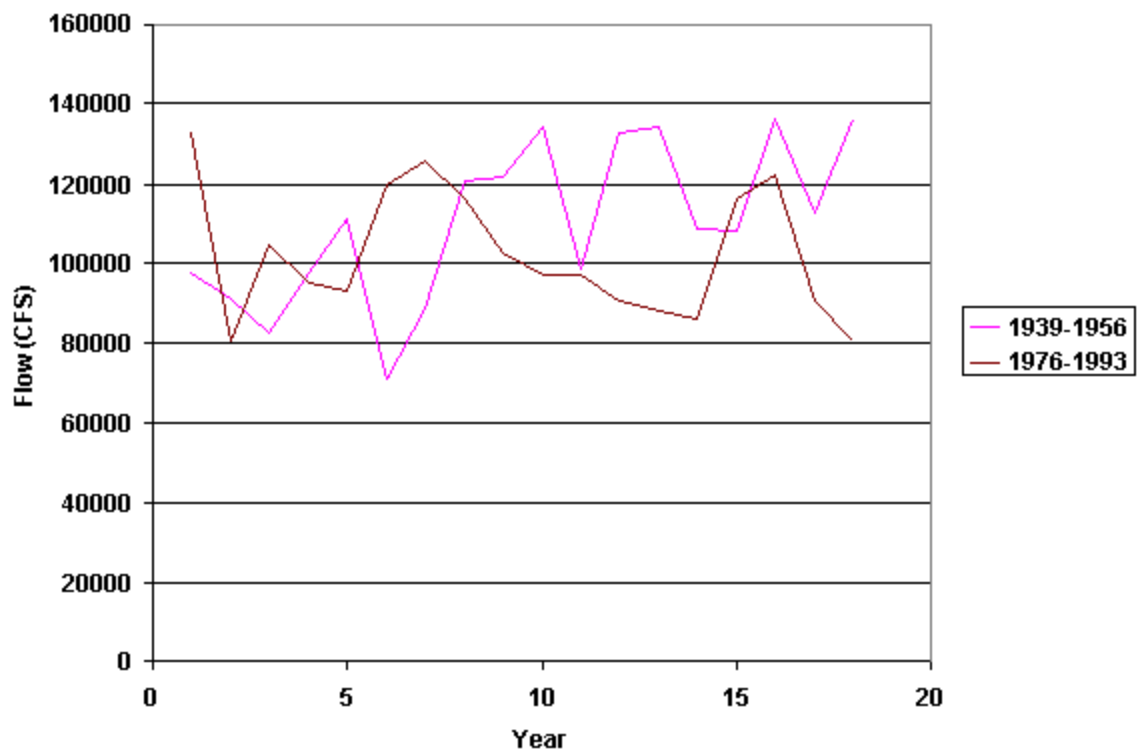


Figure 3-14. Annual Average of the Daily Average Flows at Grand Coulee for the Two Periods 1939-1956 and 1976-1993.

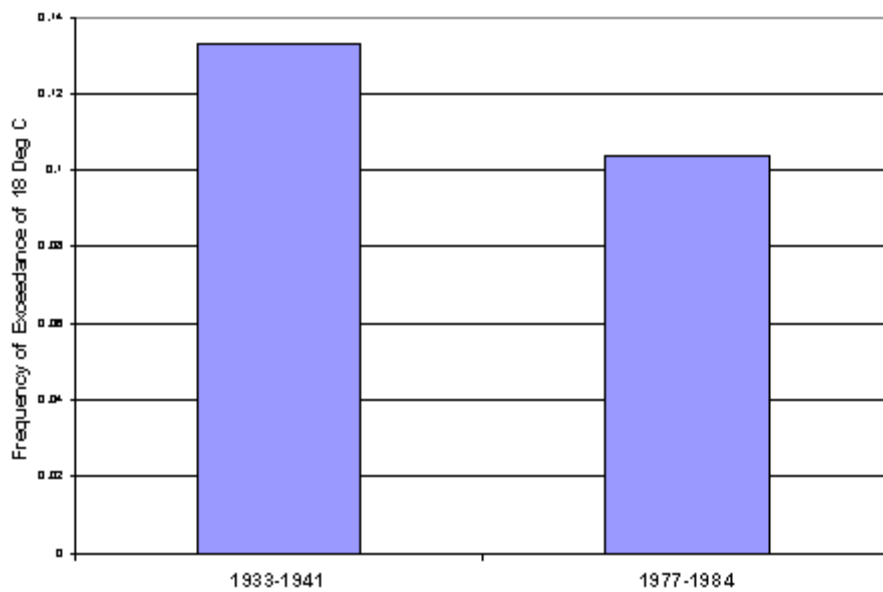


Figure 3-15. Frequency of Exceedance of 18 °C at Rock Island Dam 1933-1941 and 1977-1984

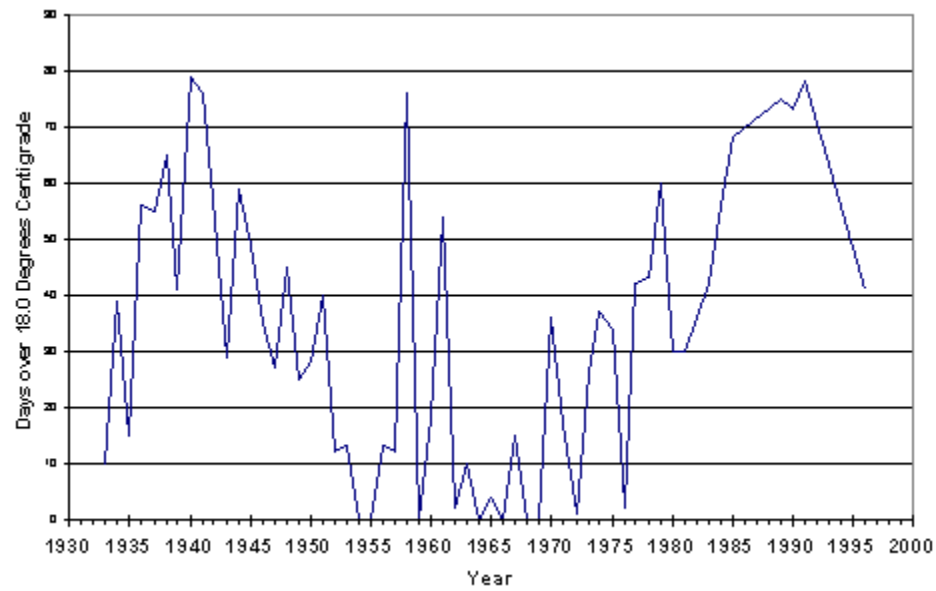


Figure 3-16. Numbers of days in which the Scroll Case Water Temperature at Rock Island Dam Exceeded 18 °C: 1933-1985, 1989,1990,1991,1996.

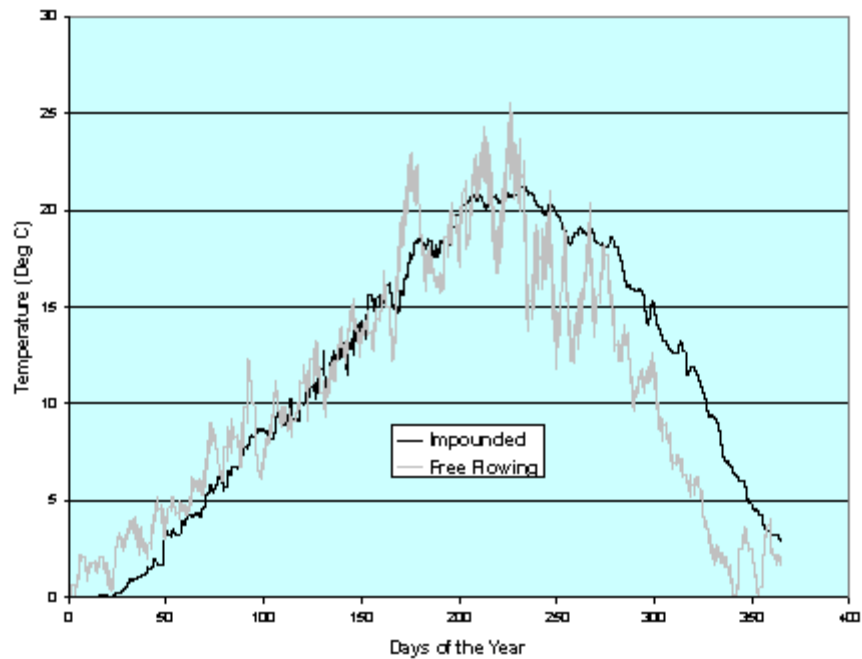


Figure 3-17. Simulated water Temperature at Ice Harbor Dam 1990 - Dams In Place and Dams Removed

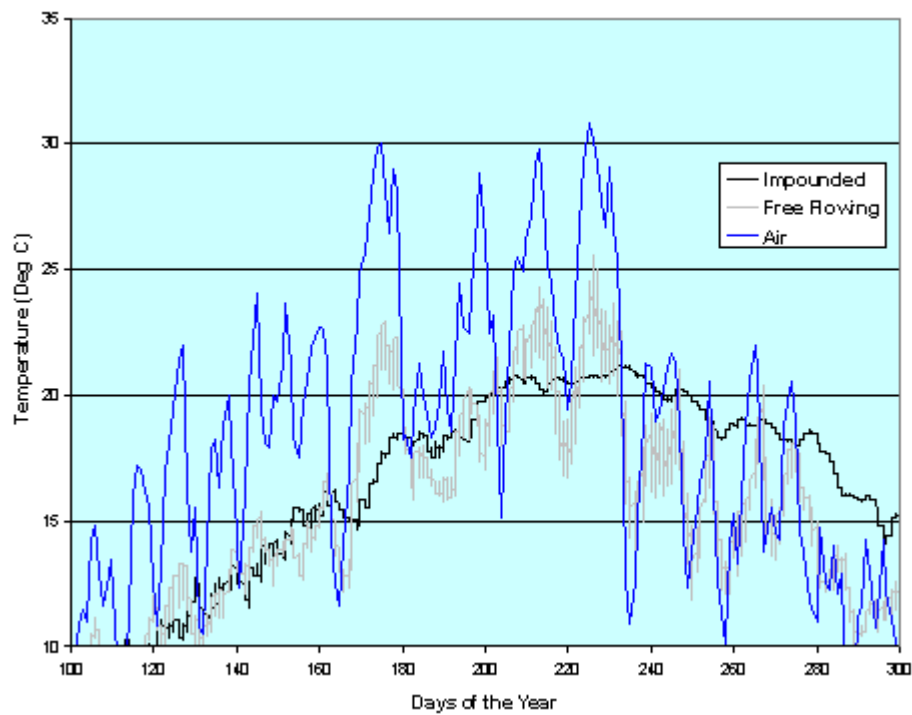


Figure 3-18. Simulations of Water Temperature at Ice Harbor Dam 1990 with Dams in Place and Dams removed compared to Air Temperature at Lewiston, ID.

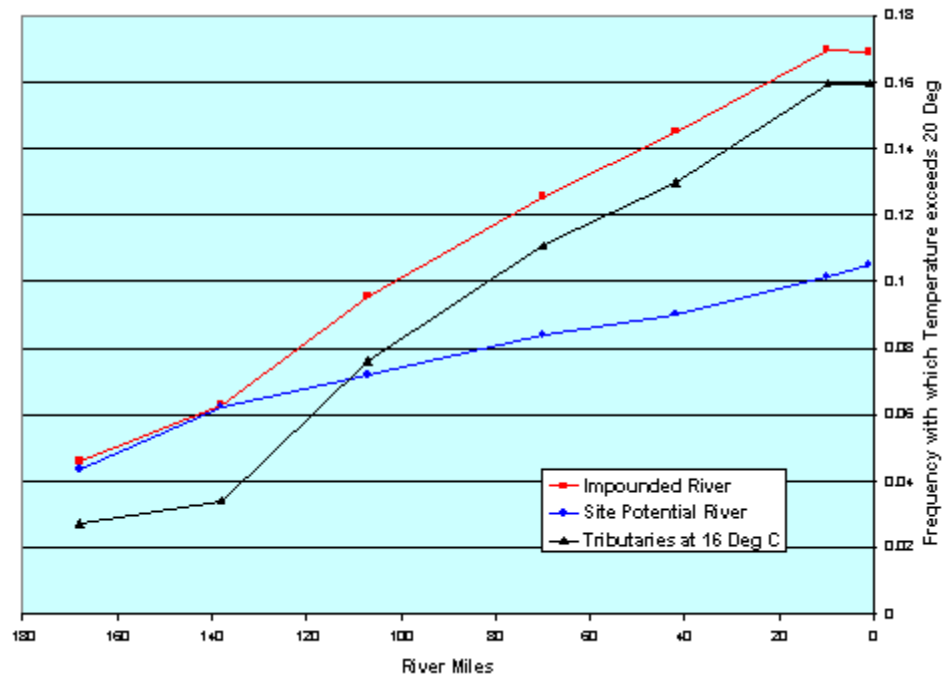


Figure 3-19. Frequency of predicted temperature excursions over 20 °C in the Snake River.

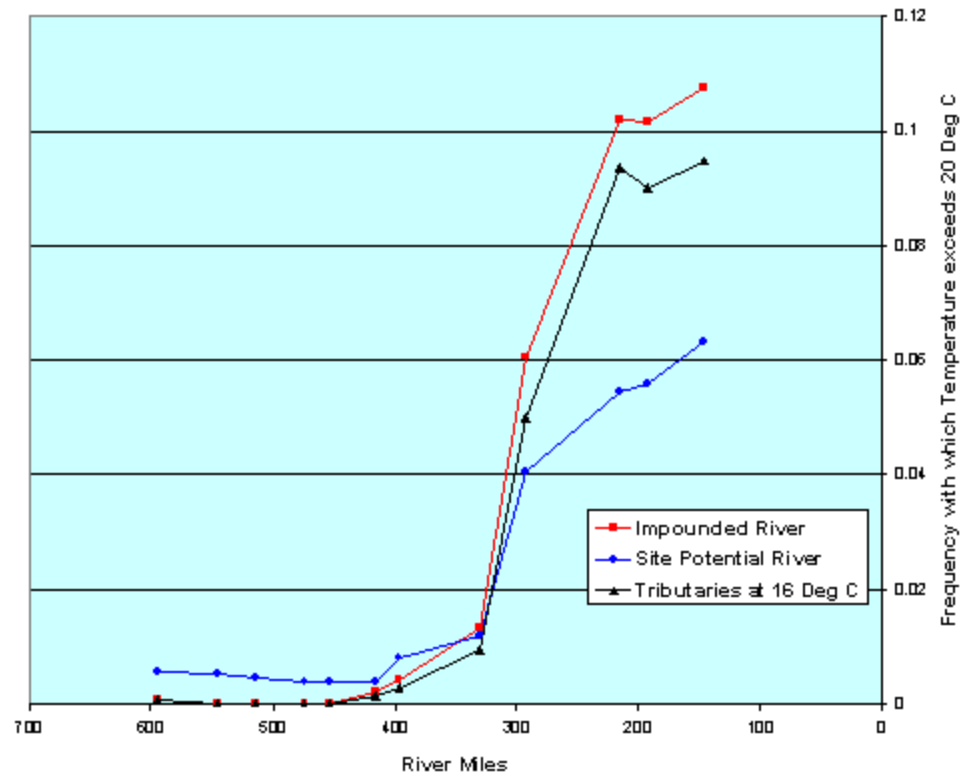


Figure 3-20. Frequency of Predicted Temperature Excursions Over 20 °C in The Columbia River.